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[For a description of climate regions of the Indian sub-continent and its general effects on agriculture and health, see 6: Spate AW1 India, category 116, pp. 40-62.]

1: Radcliffe-Brown E-5 (1906-1908)1922
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●132 The climate is warm and moist, and fairly uniform throughout the year. The mean temperature for the year at Port Blair is about 86° F. (80° F. on the wet bulb thermometer). The lowest temperatures are recorded in January and February, and the highest in March, April, or May. The average lowest temperature in the South Andaman over a period of seven years is 66·7° F., the minimum during that period being 63° F. The average highest temperature in the shade for the same period was 96° F., the maximum being 97°. The average diurnal variation is 10°.

The average rainfall of seven stations in the Penal Settlement of Port Blair, for a period of seven years, was 138 inches per annum, the averages of the different stations varying from 104 to 172 inches. For the same period the average number of rainy days in the year was 177, the minimum being 160 and the maximum 196.

The islands are sufficiently far from the Equator to have a single well-defined rainy season. The greater part of the rain falls during the south-west monsoon, which lasts from the middle of May to the middle of November. The north-east monsoon extends over the other six months of the year, which include the dry and hot seasons.

The average weather can be shown most conveniently by means of a calendar.

January. Cool; little or no rain; wind N.N.E.; nights sometimes foggy.

February. Cool; little or no rain; wind N.N.E.; very clear; light airs.

March. Hot by day, cool nights; little or no rain; wind N.N.E.; light airs, occasional haze; the weather gets hotter as the month passes.

April. Very hot; little or no rain; wind variable, off-shore at night and on-shore by day; calm and hazy.

May. The first half of the month like April; the south-west monsoon sets in about the 15th; the remainder of the month cooler and with wind W.S.W.

June. Fairly cool; heavy rains; wind W.S.W., squally.

July.
August.
September. } Do. do. do. do.

October. Variable wind and weather; generally some calm weather; waterspouts may occur.

1: Radcliffe-Brown E-5 (1906-1908)1922
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November. During the first half of the month the wind and weather are very uncertain; a cyclone may occur; after the middle of the month the north-east monsoon sets in. 132

December. Fairly cool; not much rain; wind N.N.E.

Many of the violent cyclonic storms that sweep across the Sea of Bengal seem to form themselves a little to the south of the Andamans. Cyclones of exceptional violence struck Port Cornwallis in 1844 and Port Blair in 1864 and 1891.

The aborigines of the Andaman Islands have been in their present home for a great many centuries. It is not possible to say with any degree of certainty how or when they first reached the islands. Geological and other evidence would seem to show that the Andamans were united to the mainland along the line of the Arakan Fold in later Tertiary times, but even this is perhaps not quite certain[1]. In any case the period of past land connection seems to be so remote that it had probably ceased to exist at the time when the islands were peopled by the ancestors of the present natives. If the ancestors of the Andamanese reached the islands at the time of a past land connection, they can only have done so from the Arakan region of Burma. On the other hand, if they travelled by sea they must almost certainly have started from the Burmese coast (Pegu or Arakan). The north-east monsoon would drift them thence on to the Andamans. It is conceivable that they might have travelled from Sumatra by way of the Nicobars, but the north-east monsoon would have opposed their progress in this direction, while the south-west monsoon would have driven them to the east of the Andamans[2]. It is hardly possible to imagine them coming from the Malay Peninsula across the wide 174

[1] The flora of the Andamans and Cocos contains a number of species, the presence of which can only be explained by the supposition of a past land connection with the Arakan region. (See Prain, "The Vegetation of the Coco Group," *Journ. Asiatic Soc. of Bengal*, Vol. LX, Part II, pp. 283—406.) On the other hand, the paucity of mammalian fauna is such as to lead to the conclusion that the islands were isolated at a period when the mammals now typical of the mainland did not exist there. (See Miller, "Mammals of the Andaman and Nicobar Islands," *Proc. National Museum, U.S.A.* Vol. XXIV.)

[2] There is no evidence of the former existence of Negritos in the Nicobars, but on the other hand, there is equally no direct evidence of their former presence in Lower Burma.

1: Radcliffe-Brown E-5 (1906-1908)1922
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called *Teriya*. The other division contains all the other winds, and they are collectively denoted by the term *Bilik*. They are distinguished by names, as *Ĵila Bilik* (the east *Bilik*, from *ĵila*, east) *Kọico Bilik* (the west *Bilik*), *Mẹtepur Bilik*, *Čọliatum Bilik*, *Rartear Bilik*, and *Kọičor-tọŋ Bilik*. Here we find the name *Bilik* used not as the name of a single person, but as a common name for a class of beings who are the winds personified. The same use of the term is found also in the *Aka-Kọl* tribe.

Even in the *Akar-Bale* tribe something of the same kind is found. One *Akar-Bale* man said that *Puluga* has two brothers, *Ĵila Puluga* (East *Puluga*) and *Koaičo Puluga* (West *Puluga*); the one sends all the easterly winds and the other all the westerly ones.

In the Andamans the year is divided into two nearly equal portions. During the season of the south-west monsoon, which lasts from May to September, the wind blows steadily from the south-west. This is the rainy season. Violent storms never or only very rarely occur during the season of the south-west wind. From December to March the wind blows mostly from the N.N.E., occasionally changing to E.N.E. or N.E. In the periods at the change of the monsoon (from N.E. to S.W. in April and May, and from S.W. to N.E. in October and November) the wind is variable, and may blow at times from E.S.E. or W.N.W.

The south-west wind (properly speaking W.S.W.) is identified, as we have seen with *Tarai* (*Deria*). Although *Biliku* (*Puluga*) is specially connected with the north-east wind, yet all the winds other than the south-west are commonly supposed to be sent by *Biliku*. Thus we have seen that in the *A-Pučikwar* tribe the different winds are named, each of them (with the exception of the south-west) being a *Bilik*.

It comes about, in this way, that the year is divided into two portions, one of which is specially connected with *Biliku* (*Puluga*), while the other is specially connected with *Tarai* (*Deria*). These two seasons are not quite of equal length. The *Tarai* season lasts only while the south-west monsoon is blowing, which, in an average year, is between four and five months. The other seven months are connected with *Biliku* and are divided into three portions, (1) the stormy season of October

1: Radcliffe-Brown E-5 (1906-1908)1922
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821
132
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821

and November, (2) the cold season of December to February, and (3) the hot season of March and April.

There are many points relating to *Biliku* and *Tarai* about which there is no general agreement amongst the tribes, or, in some cases, even within the same tribe. In the North Andaman *Biliku* is regarded as female, and is called *Mimi Biliku*, while *Tarai* is male and is called *Maia Tarai*. This is so in all the four tribes, *Aka-Čari*, *Aka-Bo*, *Aka-Kǫra* and *Aka-J̌eru*. A statement that is frequently made by the natives of these tribes is that *Tarai* and *Biliku* are husband and wife. While this is the most common statement, there are, however, other versions of the matter. In order to show the lack of uniformity in statements about *Biliku* and *Tarai* in the Northern tribes I reproduce a few extracts from my note-books written down exactly as they were given to me.

(1) *Biliku* is the wife of *Tarai* and they have a child named *Perǰido*. (This statement was made to me a great many times in the North Andaman, and may be regarded as the most usual form of the belief.)

(2) *Biliku* is the wife of *Tarai*. Their children are the sun and moon. (Heard only once.)

(3) The husband of *Biliku* is *Perǰido* and her children are *Totaimo*, *Mite* (cicada) and *Tarai*.

(4) *Biliku* is unmarried, but she has a son *Perǰido*, and her other children are *Tǫrǫi*, *Čelene*, *Čotǫt*, and *Čerei*. These four are the names of birds.

(5) *Biliku* is the wife of *Tarai*. Their children are *Tǫrǫi*, *Taka*, *Čotǫt*, *Poruatǫko*, *Kelil*, *Cǫpcura*, *Benye*, *Biratkoro*, *Čereo*, *Milidu*, *Bobelo*, *Kǫlo*. These are all names of birds.

(6) *Biliku* has a husband *Tǫrǫi* (a bird). *Tarai* has a wife *Kelil* (a bird).

In the *Aka-Kede* tribe the most common statement, at any rate in the northern part of the tribe, is that *Bilika* is female, and that *Tarai* is male. One *Aka-Kede* man, from the southern part of the tribe said that *Bilika* was male.

In the *Aka-Kǫl* and *A-Pučikwar* tribes *Bilik* is generally spoken of as being male, and *Teriya* is also male. Other versions from these tribes are as follǫws:—

1: Radcliffe-Brown E-5 (1906-1908)1922
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Andaman Islander feels about the fire as being the one thing on which the society most completely depends for its welfare. 182X

The preceding analysis has shown that the legends relating to the origin of animals, whether through the action of fire, or by the flood, serve to express the social value of fire. If this interpretation be correct we have a close parallel to the explanation of the story of the origin of night. In both cases, it has been argued, what the legend really expresses is the way in which a particular phenomenon (fire, in one case, the alternation of day and night in the other) affects the life of the society and the sentiments on which that life depends. The legends of the catastrophe, however, obviously contain another element of importance, revealing as they do a certain way of thinking about the animals. This element has not yet been explained. The representation of the birds, etc., as ancestors is not confined to one particular legend or group of legends, but runs through them all. Its explanation is therefore better postponed until we come to deal with the general features of the mythology, and will then have to be undertaken.

Let us now turn to the legends that concern *Biliku* (*Puluga*) and *Tarai* (*Deria*), which are of capital importance in the Andaman mythology. The clue to the understanding of them lies in the Andamanese notions about the weather and the seasons. In the Andaman Islands the year may be divided into four seasons. There is the cool season lasting from the beginning of December to the middle of February; immediately following this is the hot season from February to the middle of May; then comes the rainy season, from May to the end of September; October and November constitute a short season to themselves. In the cool season the weather is uniformly cool; there is very little rain, and storms are almost unknown; the wind blows uniformly from the N.E. In the hot season there is little or no rain; the wind is generally N.E., but may be variable; summer lightning is frequent, but there are no violent storms except at the very end of the season. During the rainy season, after a short period of uncertain stormy weather with which it begins, the wind blows uniformly from the S.W.; it rains heavily, sometimes every day for weeks together, but

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1: Radcliffe-Brown E-5 (1906-1908)1922
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violent storms (cyclones) are very rare. Between the rainy season proper and the cool season there is a period of six or eight weeks in which the weather is unsettled; the wind is variable; fine weather alternates with storms that are sometimes of terrific violence; waterspouts are frequent; it is at this season that violent cyclonic storms are likely to occur. This season is called by the Andamanese *Kimil* (*Gumul* of *Aka-Bea*). We have seen in the last chapter that the word *kimil* denotes a condition of social danger, or of contact with the power possessed by all things that can affect the life and safety of the society. It is obviously in this sense, and not as meaning "hot," that it is applied to the season in question, for the months of October and November are fairly cool, certainly very much cooler than February and March. We shall find that this is an important point in connection with the *Biliku* myth.

The life of the Andaman Islander is profoundly affected by the alternation of the seasons. There are, first of all, the violent cyclonic storms that occasionally occur. Such a storm may uproot the jungle for miles, making it impassable for years to come, and thus destroying some of the native hunting grounds. The wind is sometimes so violent as to tear every leaf from the trees in its path. While the storm lasts there is danger to the lives of the natives. An old man recounted to me how on the occasion of a violent cyclone he and the others of his village took refuge in the sea and on the open shore from the danger of falling trees, and remained there till the violence of the storm had abated. The usual name for a cyclone in *Aka-Jeru* is *tokɔ-pɔr*, i.e. "falling wood" or "falling trees." Even if all the natives escape the danger of death or injury, there is still the extreme fear and discomfort of the experience. If a storm lasts for any length of time the natives, who are unable or afraid to go out hunting, have to do without food until it is over. Incidentally the storm may destroy their huts, canoes, and other property and thus cause loss that has to be made up by toil.

The second important effect of the seasons on the life of the Andamanese is through the food supply. During the cool season, and the succeeding hot season, a number of vegetable foods, including the very important roots and some of the most

1: Radcliffe-Brown E-5 (1906-1908)1922
AZ2 Andamans AZ2

prized fruits, are available. On the other hand, during these seasons the land animals are in poor condition. In the hot season, at any rate, lizards, snakes and the civet-cat are not eaten. Pigs are breeding and are in such poor condition that often a pig that has been killed is left in the jungle as being not good enough to eat. The hot season is pre-eminently the season of honey, which is so abundant that the natives are able to obtain much more than they can consume. In the rainy season there are few vegetable foods and very little honey, but on the other hand the jungle animals are in good condition and flesh food is abundant; fish are more plentiful in this season than during the dry weather. In the *Kimil* season (October and November) the natives add to their food supply two varieties of grub (the larvæ of the cicada and of a beetle) which are regarded as great delicacies. Roughly we can say that the rainy season is the season of flesh food, the *Kimil* season is the season of grubs, the cool season is the season of fruits and roots, and the hot season is the season of honey.

By reference to the prevailing wind the year may be divided into two parts, the N.E. monsoon from November to May, and the S.W. monsoon from May to November.

I propose to show that the Andaman Islanders express the social value of the phenomena of the weather and the seasons, i.e., the way these phenomena affect the social life and the social sentiments, by means of legends and beliefs relating to the two mythical beings whom they call *Biliku* and *Tarai*. Using the word personification in a sense to be defined later in the chapter, we may say that the Andamanese personify the weather and the seasons in the persons of *Biliku* and *Tarai*. *Biliku* is associated with the N.E. monsoon; she lives in the N.E.; the wind from that quarter is called "the *Biliku* wind"; to *Biliku*, therefore, belong the cool and the hot seasons, these being the seasons of the N.E. monsoon. *Tarai* is associated with the S.W. monsoon; he lives in the S.W.; the wind from that quarter is called "the *Tarai* wind," or, in *Aka-Bea*, simply *Deria*; to *Tarai* therefore belongs the rainy season. It is possible to show that the Andaman Islanders associate with these two beings all the phenomena of the weather and the seasons, and are able to

2:Man G-5 (1869-1880)1932 AZ2 Andamans AZ2

131 siderable distance eastward of Great Andaman, but connected with the group, are two small uninhabited islands known as Narcondam and Barren Island, both of which contain volcanoes, though the latter only is active at the present day. To the south, and about midway between Great Andaman and the northernmost point of the Nicobar group, lies Little Andaman, consisting of a single island about 27 miles in length, and varying in breadth from 10 to 16 miles; there are also a few small islets near its coast.

None of the islands exceed 20 miles in breadth, and the area of the entire group is estimated at about 2,508 square miles, four-fifths of which are comprised in Great Andaman.

133 Nearly all the high land occurs in the vicinity of the east coast, shelving gradually towards the west, where few, and those but minor, elevations are to be found. The principal hills are: Saddle Peak[1] (2,400 feet) in North Andaman, overlooking Port Cornwallis; Ford's Peak (1,400 feet) on Rutland Island; and Mount Harriet (1,100 feet) in South Andaman, commanding the harbour of Port Blair.

132 The climate of the Andamans much resembles that of Lower Burmah, and the temperature throughout the year is very uniform; the variation in the shade during the dry season is about 22°, and averages 17° during the remainder of the year; the extreme variation throughout the twelve months may be estimated at 26°, viz., between 70° and 96°. The cool season sets in during the last weeks of December and early part of January, and the hot season lasts through the months of March and April. The S.W. monsoon commences in the latter part of April or early in May, and usually terminates about the end of October, but on the change in the direction of the wind to N.E. heavy showers frequently occur for several weeks, and even, though at rare intervals, in January and February. The average number of wet days in the year is 182, and the rainfall 116 inches; the dry season is usually characterised during the first two months by strong winds from N.E., which cause sickness and prove equally prejudicial to vegetation. Although it has been ascertained that many of the most severe cyclones which have occurred in the Bay of Bengal during the past twenty-five years have had their origin in the immediate vicinity of the Andamans, only one is recorded (viz., in 1864) as having visited the islands themselves; in the same period there have been a few earthquakes, the first of which mention is made took place in August, 1868, and the next in February, 1880, from which time several slight shocks were felt until, in December (31st), 1881, another severe earthquake visited the group, the effects of which were

[1] The only ascent on record of Saddle Peak was made in February, 1882, by Major M. Protheroe, C.S.I., and other officers of Port Blair.

2: Man G-5 (1869-1880) 1932 AZ2 Andamans AZ2

experienced on both the Indian and Burman coasts; another, though slighter, shock was felt on February 27th, 1882.[1]

Among the many noteworthy features of these islands are the numerous harbours in which, especially on the east coast, safe anchorage can be obtained at all seasons of the year; the most important and best known of these harbours are: Port Blair in South Andaman, and Port Cornwallis[2] in North Andaman; of both it has been said they may be classed among the finest harbours of the world, affording ample accommodation as well as shelter to even "half the British navy," in addition to which, from their central position in the Bay of Bengal, they present great advantages to vessels in need of refitting, and also as ports of refuge.

The water[3] in the harbour of Port Blair has been found to be remarkable for its high density, as is evidenced by the rapid oxidation of iron immersed in it; its extreme clearness has also attracted the notice of many, who have viewed through its pellucid depths the wonderful coral beds which abound in certain parts of the coast. The marvellous variety of the colouring to be found among these corals must be seen to be appreciated, but some idea of their wondrous beauty may be formed from the following extract:—"As we steamed along, visions of the splendours of the submarine world broke upon our view; . . . I feel quite unable to attempt the task of describing, much less conveying an adequate idea of the exquisite assortment of colour, of the varied forms of life which were included in every square yard of these tropical coral reefs. The most gorgeous combination of vegetable and animal life afford but a poor sub-aërial representation of these submarine gardens."[4] But to return.

[1] On the occasion of the disastrous earthquake in the Straits of Sunda (August 26th, 1883), a report as of a distant signal gun was heard at Port Blair at about 8 P.M. of that day, followed by several similar reports at irregular intervals during the next two days. It was thought at the time that a vessel was wrecked off the coast, and the station steamer was sent out to render assistance; at 7 A.M. on Monday (27th) the sea rose and receded thrice in the course of a few minutes.

[2] This was the harbour selected in 1824 as the rendezvous of the fleet conveying the expedition under Sir Archibald Campbell to Rangoon during the first Burmese war.

[3] The supply of water from the tanks and wells in the Settlement is pronounced on medical authority to be both good and plentiful, and no diseases have ever yet been traced to the use of these waters.

[4] *Vide* "Jungle Life in India," pp. 359-360, by V. Ball, Esq., F.R.S. The vivid description by the same writer of a coral reef at the Nicobars (*vide* p. 202) is so applicable also to those at the Andamans, that I feel the reader will thank me for appending it in this place:—"There are corals which in their living state are of many shades of fawn, buff, pink, and blue, while some are tipped with a majenta-like bloom. Sponges which looked as hard as stone, spread over wide areas, while sprays of coralline added their graceful forms to the picture. Through the vistas so formed, golden-banded and metallic-blue fish meandered, while on the patches of sand here and there the *holothurias* and various mollusca and crustaceans might be seen slowly crawling."

DIAGRAM SHOWING RELATIVE AND ANNUAL RAINFALL OF PLACES CLOSE TOGETHER ABOUT PORT BLAIR HARBOUR FOR SEVEN YEARS.

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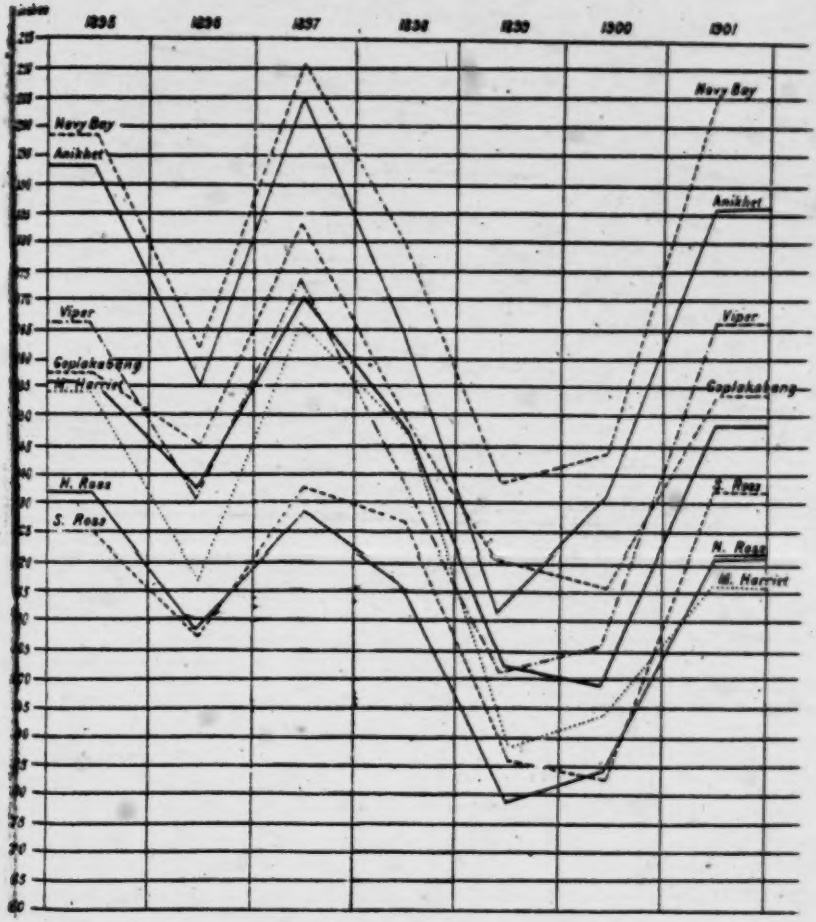

Broad line — Mean of all Stations.

Central Station (Official) South Ross from which—

North Ross is distant	directly		1	Mile	North	...	Height 150 ft.
Mount Harriet	"	"	3½	"	North West	"	1,200 ft.
Coplakabang	"	"	7½	"	North West	"	sea level.
Viper	"	"	5	"	West South West	"	150 ft.
Anikhet	"	"	5½		West North West	"	100 ft.
Navy Bay	"	"	2½		South West West	"	200 ft.

[Facing p. 38]

000 area of sea and land. It is therefore not sufficient for accurate warnings and forecasts to have meteorological stations round the Bay; they must be also established if practicable within it. The Andaman and Nicobar Islands can provide a number of such stations right across the Bay from north to south.

The magnitude of the interests requiring accurate storm warnings can be gauged thus. In Bengal *excluding Madras and Burma*, about 4,400 vessels of a combined burthen of about 3½ million carrying tons, conveying 300,000 passengers and cargoes to the value of upwards of ₹11½ crores annually, leave and enter the Bengal ports in the coasting trade alone. The ever increasing size of the vessels carrying the trade implies an ever increasing number of passengers and size of cargoes in each bottom and a corresponding increasing value of each individual ship and increasing importance in saving it from loss or damage. So also the magnitude of the interests requiring accurate weather forecasts is very great. Of industries directly depending on the rainfall in the Bay of Bengal:—jute exported from Bengal, raw and manufactured, has an average annual value of about ₹14½ crores and the plant is grown on nearly 2 million acres; rice, as a staple food crop, in Bengal alone has an annual outturn of 20 million tons raised on between 30 and 40 million acres; tea has an average annual export in Bengal of about 7½ crores, and indigo of about three crores. Again the purchasing power of the native of Bengal depends on the state of the rice crop and hence the rate of piece-goods there depends so much on the rainfall that merchants closely watch it: this trade represents an average annual value of about 14 crores.

The great importance to commerce therefore of weather forecasts has brought about repeated attempts to connect the Andaman Islands with the continent by telegraphs, as otherwise the meteorological observations have merely a scientific value, being received in India too late for practical purposes. In 1867 a serious attempt at a cable to Port Blair failed owing to initial and maintenance costs involved and also the hilly nature of the sea-bottom about the islands. Since 1900 the question has been reopened with a view to establishing a connection with the islands by wireless telegraphy.

●132 **Climate.**—Speaking generally, the climate of the islands may be described as normal for tropical islands of similar latitude. Warm always, but tempered by pleasant sea breezes: very hot when the sun is northing: irregular rainfall but usually dry during the north-east monsoon and very wet during the south-west: exposed to both monsoons and subject to violent weather with excessive rainfall, but to cyclones rarely, though within the influence of practically every cyclone that blows in the Bay of Bengal, hence the value of the islands from a meteorological point of view. Cyclones have been recorded in every month except February and heavy rain has fallen throughout the year, but cyclones are unusual except from May to November, the early part of November being the most likely season for them, and much rain is not usual from December to May.

Cyclonic Storms.—Accounts and records show that cyclonic storms struck Port Cornwallis in December 1792, the Archipelago in November 1844, and Port Blair in 1864 and November 1891. There are also abundant signs of a destructive storm between Stewart Sound and Port Cornwallis in 1893. The great storms of 1891 and 1893 travelled across the islands in a north-westerly direction creating havoc on both East and West Coasts. There is a full and valuable record of the disastrous storm of 1891 (*Cyclone Memoirs*, No. V., Government of India, 1893).

Rainfall.—The rainfall varies much from year to year and to an extraordinary extent at places quite near to each other. The official meteorological station is situate in by far the dryest spot in Port Blair. The official statistics as to rainfall for the past seven years are:—

1895.	1896.	1897.	1898.	1899.	1900.	1901.
125·64	107·28	136·41	127·22	87·01	83·28	132·59

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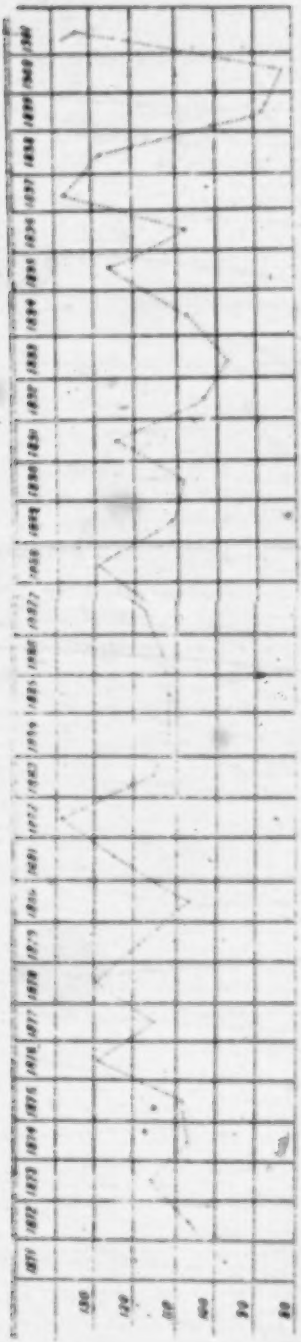


RAINFALL IN INCHES FOR 30 YEARS.
1871 – 1901.

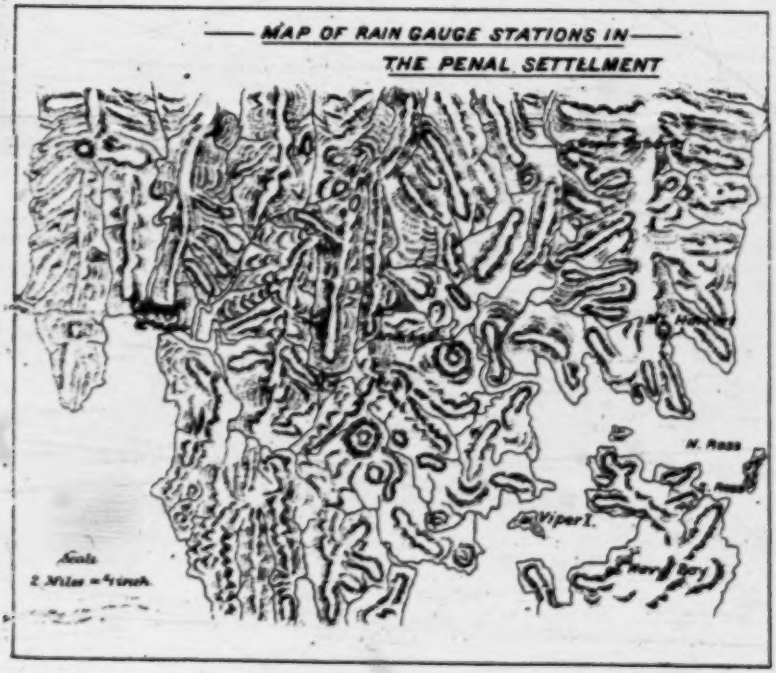
1871	97.95
1872	106.55
1873	118.68
1874	106.46
1875	108.49
1876	129.97
1877	114.82
1878	128.88
1879	119.71
1880	107.46
1881	125.56
1882	137.67
1883	115.00
1884	102.75
1885	111.32
1886	102.60
1887	116.76
1888	128.27
1889	110.35
1890	100.57
1891	124.11
1892	102.25
1893	96.51
1894	117.73
1895	125.64
1896	107.28
1897	136.49
1898	127.22
1899	89.01
1900	83.28
1901	132.63

[Facing p. 39]

3: Temple G-5 (1901) 1903 AZ2 Andamans AZ2

There are, however, altogether seven rain gauges maintained at Port Blair within an area of 80 square miles with these results :—

	1895.	1896.	1897.	1898.	1899.	1900.	1901.
North Ross	133·34	109·73	123·62	110·49	79·03	83·50	121·37
South Ross	115·64	107·48	136·41	127·21	87·01	83·24	142·59
Anikhet	194·97	155·19	205·53	165·08	112·35	132·09	187·38
Goplakshang	158·08	145·10	184·92	151·70	122·88	115·45	152·16
Mount Harriett	154·68	117·08	168·62	149·14	88·94	92·40	119·99
Navy Bay	199·17	161·11	212·75	179·73	139·73	144·18	205·54
Viper	158·95	131·50	169·14	140·80	102·57	106·06	169·47
Mean of all stations	156·37	132·43	171·98	147·05	106·40	108·13	149·08



132 **Weather.**—Calm weather can be counted on in February to April and in October. Fogs and chilly night winds are common in January to March in the valleys and inner harbour and also after excessive rain. Off shore breezes at night and on shore breezes in the day are most marked during the calm weather, due to the difference in temperature of sea and land. March and April are often hazy. Magnetic variation in the Andaman sea in 1904, 0° 40′ East, decreasing annually 2′. The normal barometric readings vary between 29·873 and 29·722, being highest in February and lowest in June.

General Statistics.—General meteorological statistics for Port Blair for the last seven years are :—

	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Temperature.							
Mean highest in shade	April 90·1	April 94·7	April 94·0	April 98·3	Mar. 91·8	April 94·1	April 95·1
Mean lowest in shade	Feby. 70·9	Feby. 71·7	Jany. 72·5	Jany. 70·3	Feby. 71·2	Dec. 72·9	Dec. 71·9
Highest in shade	April 95·2	May 96·9	April 96·9	April 93·8	April 95·8	April 97·0	April 97·1
Lowest in shade	Feby. 66·4	Feby. 66·9	Jany. 67·8	Mar. 63·2	Jany. 67·0	Jany. 65·0	Dec. 67·7
Dry bulb mean	84·6	85·5	85·2	84·5	84·9	90·6	91·7
Wet bulb mean	78·9	79·4	79·7	78·4	73·6	82·5	83·0
Rainfall.							
Most wet days in a month	Aug. 23	Aug. 31	July 25	July 26	Sept. 27	June 27	Aug. 23
Heaviest fall in a month	June 26·29	May 27·55	July 20·97	May 40·33	Sept. 24·35	Sept. 13·44	May 20·81
Months without rain	Jany. Feby.	Feby. Mar.	January.	Feby. Mar.	Nil.	February	Nil.
Total wet days	183	178	196	166	177	162	158
Wind.							
N. N. E.	Jany., Feby., Mar., Dec.	Jany. Feby. Mar., Nov., Dec.	Jany., Feby., Dec.	Feby., Dec.	Feby., Nov., Dec.	Jany., Mar., Nov., Dec.	Jany. Feby.
E. S. E.	April, Oct., Nov.	—	Mar., April Nov.	—	April, Oct.	—	—
W. S. W.	May, June, July, Aug., Sept.	June, July, Aug., Sept.	May, June, July, Aug. Sept. Oct.	May, June, July, Aug., Sept.	May, June, July, Aug., Sept.	May, June, July Aug., Sept.	May, July, Aug., Sept. Oct.
W. N. W.	—	April, May, Oct.	—	—	—	April	June.
E. N. E.	—	—	—	Jany., Mar., April	March.	—	—
S. S. E.	—	—	—	Oct., Nov.	—	October	April, Nov.
N. E.	—	—	—	—	January	February	Mar., Dec.
Clouds.							
Clouds are usually	F. K. & C. F. K. & P. C. *	C. & K.—P. K. & P. C. *	P. K. & P. C. *	Cu. N. Acc. Ci. *	Cu. N. Acc. Ci. *	Cu. Acc. N. Ci. *	Cu. Acc. N. Ci. *

* F. K = Fallio-Cumulus : C & Ci = Cirrus : P. C. = Fallio-Cirrus : K. = Cumulus : Cu. N. = Cumulo-Nimbus : Acc. = Alto-Cumulus.

Tide.—The tidal observatory with self-registering gauge on Ross Island, established in 1880, is in latitude 11° 41′ N., longitude 22° 45′ E. The Port Blair tide tables are printed by authority from local data. The heights are referred to the Indian spring low-water mark, which for Port Blair is 3·53 feet below mean sea level. The mean range of greatest ordinary springs is 6·6 feet. The highest high-water and the lowest low-water are 8·0 feet above and 0·8 feet below the datum above mentioned. The apparent time of high-water at the full and change of the moon is 9h. 36m. At various points of the great harbour of Port Blair the actual times for the tide depend on wind, strength of current, and distance from the open sea. The average variation in time of high tides at the several important points is from 18m. to 57m. later than Ross and in height it is from 20 inches less to 17 inches more than Ross. Wind and current will at these points affect time by as much as 29m. either way, and height by as much as 8 inches either way.

III. Geology.

135 133 **General Geology.**—There has been no geological survey of the Andamans, but expeditions by experts have been officially undertaken to make preliminary examinations of the islands. These examinations have been carried on under practical difficulties of every kind, not the least being the dense and lofty forests with which the entire islands are covered. Judging by the reports of such

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

161 177 182 Of the two main groups of aborigines, the Great Andaman Group and the Little Andaman Group, the former being the most widespread and numerous in the Great Andamans has become completely non-existent depicting the example of the decay within an extremely short time, especially since the impact of the foreign people. The fate of the later group is also quite shattering—the Jarawas have experienced both numerical decay and territorial shrinkage and the Onges are the only tribes who live exclusively in the Little Andaman but they have been also facing the signs of decay.

133 A glance at the map of the Andaman islands and adjacent countries shows the continuity of these islands with the Arakan Yoma of Burma in the north and with the Indonesian islands in the south. The islands of both the Andaman and Nicobar groups are primarily of sedimentary formations of the Eocene period with occasional igneous intrusions. Later formations of coral are also quite widespread. The surface topography of the regions is typically flat-topped being typical of the sandstone regions and the peaks are in most cases formed of igneous intrusions. The islands are comprised of a number of longitudinal ranges running from the north to the south and in between the ranges short streams flow. The heights of the hills are generally 1000′ and never exceed 2500′.

132 The islands experience a high annual temperature and the yearly rainfall is as high as 130 inches in Port Blair and the amount decreases as one moves to the north and the east. The ameliorating influence of the sea is quite appreciable.

131 With an area of 2508 square miles and the number of islands being as many as 204, only 4 main islands, North Andaman (490.20 sq miles), Middle Andaman (561.00 sq miles), South Andaman (359.51 sq miles) and Little Andaman (289.90 sq miles) have an area of more than 100 sq miles and the rest are sufficiently small in size either to command human settlement or economic activity.

101 The economy of the tribal people is of the primitive form of hunting and collecting though the precise modes of living vary to some extent depending upon the nature of environment under which they have to live. The knowledge of distribution and of actual number of these aborigines is far from accurate. The Andamanese were the most widespread in all parts of the Great Andamans and in the South Andaman they (Aka bea) had to remain vigilant against the possible attacks and territorial expansion of the Jarawas. The Andamanese, as said earlier, have completely died out. The Jarawas, though have dwindled to a negligible number,

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Bay, Kalara Bay, Congo Bay etc. in the North Andaman and Betapur river valley and Bomlungta river valley in the Middle Andaman.

Hydrography.

The study of the hydrography of a region includes petamology (study of rivers), limnology (lakes), cryology (snow) and geohydrology (underground water). The study of limnology and cryology of this region can be completely omitted because there is a complete absence of both lakes as well as snows or glaciers. Of the rest the geo-hydrology of the Andamans is little known because no research work regarding this aspect has been conducted.

The petmology or the study of rivers is the most important object of hydrology. The rivers are very short, non-perennial as well as torrential in character. They can better be called as streams because of their seasonal drying up and short length. The Andamans enjoy quite heavy rainfall of about 130", but because of the seasonal fall, the water-level of the streams fluctuates very greatly and in the dry season most of the rivers either do not have any water or have only a trickle of water. Little water in the river valleys may also be partially due to the pervious nature of the soil which does not help the water-table of the region to be sufficiently high. The greater as well as continuous rainfall throughout the year in the South Andaman keep the rivers almost perennial. [132] [134] [132]

The Middle Andaman has only a few little rivers and they are Betapur and Bamlangta rivers. Both of them rise from the hill ranges of the continuation of Mt. Harriet Range in Middle Andaman and flow through the longitudinal valleys, and are interrupted by a great number of spurs from both the eastern and the western hill ranges. The Betapur river rises in the north of Middle Andaman and flows towards the south with a number of tributaries from both the ranges on both the sides. Almost the whole of the northeast Middle Andaman is drained by the Betapur river and its tributaries. According to Mr. Sethi, the country from the place where the Picha Nala meets the Betapur stream, though interrupted by small hills, is almost level for 7 or 8 miles.

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CHAPTER IV

CLIMATE OF THE ANDAMANS

132 The situation of the Andamans between 10°30′ and 13°30′ north latitudes and 92°15′ and 93°10′ east longitudes makes the climate of these islands of the tropical type which closely approximates to the Equatorial one in the south. The islands are frequently disturbed by tropical storms and cyclones in specific months. The insular position of the islands in the Bay of Bengal in between two countries in the east and west, situation in the tropical zone, location in the path of travelling tropical storms and cyclones in specific months, influence of the tropical maritime air masses in the south and the air masses of the subcontinent of India and other countries of Asia in the north, considerable northsouth extension but appreciably small eastwest extension, broken coastline and peculiar shape, and the dominant functional controls of the northeast and southwest monsoons in the specific months of the year have all combined together to give a distinct feature of the climate of the Andamans. The influence of all these factors, in giving a characteristic impress over the islands, must be understood before we consider the general conditions of climate and the division of the islands into different such regimes and the influence of climate on agriculture.

THE DIFFERENT CLIMATIC CONTROLS.

Insular Position and Shape.

131 The insularity of the islands is obvious because of their presence in the base of the funnel of the Bay of Bengal. The funnel is enclosed 132 in the west and east by the east coast of the Indian mainland and the west coasts of Burma and Malay, and both these coastlines taper in the north in the deltaic region of Bengal. In the south the whole sea opens out and extends upto the Antartica. The islands, being 192 miles long and 32 miles wide, when maximum, with a number of bays and creeks penetrating deep into the interior of the islands make no spot on the Andamans more than 10 miles from the sea. This has helped the development of the maritime conditions of the islands at its maximum and has therefore, led to a great moderating influence of sea on temperature.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

Control of the Air-Masses All Around The Islands.

In the south of the islands is the presence of the tropical maritime air mass (mfu) of the convergent type which is characteristic of equatorial regions over continents and oceans. This type of air mass is highly charged with humidity and it produces abundant cumulonimbus clouds and consequently causes heavy showers, "even in the absence of strong trigger action. Then while neutral mfu air usually requires strong trigger action to produce heavy showers, convergent mfu air provides an environment in which strong convection is eastly induced."[1]

The trigger action for the movement of the air masses and consequent release of its energy in the form of rainfall is provided by the land mass in the north i.e. India as well as the whole of Asia. The conditions in July are highly favourable for the growth of a centre of low pressure in the northeast and a secondary one over the northwest India because of its continental character and simultaneously with it has developed a centre of high pressure over the Indian ocean south of the 30°N latitude. Such a development of the pressure gradients necessarily initiates the energy for the movement of the heavy air masses over the Indian ocean towards the northwest and after crossing the equator towards the northeast. This is what is known as the southwest monsoon which because of its passage towards higher latitudes (with a gradual decrease in temperature) accelerates the tremendous release of the energy of the air masses and causes a very heavy rainfall. The Andamans facing the full force of the southwest monsoon experiences heavy rainfall during this season and during this period the maximum rainfall occurs in the islands.

In the cold-season, with the beginning of January, the conditions are reversed. The former seats of low pressure are replaced by high pressure and the comparatively heavier air masses move towards the south (in general sense). The winds from the Indian mainland as well as China blows towards the south and a major stream in the Bay of Bengal. Here again the islands experience rainfall of the northeast monsoon which is comparatively lower in amount.

Location of the Islands in the Path of the Travelling Tropical Storms and Cyclones.

The tropical cyclones originate in low latitudes within or along the margins of the equatorial calms. Generally the tropical cyclones do not

1. Trewartha, G. T.—An introduction to climate, Methuen, London.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

132 originate within areas of prevailing steady or strong winds. It has been investigated by S. C. Roy and A. K. Roy[1] that the cyclones are predominant over Bay of Bengal during the transition period. "In the beginning of the hot weather in India in April, a slow current of the southwesterly winds of local original sets in the north of the Bay of Bengal. The winds become irregular in the southern parts of the Bay. But northerly and northwesterly winds of land-origin still prevail on the Arabian Sea. By May the southwesterly winds of local origin dominate the whole of the Bay and set in also over the west of the Arabian sea. During this transition period oceanic air of great depth occasionally penetrate into the south of the Indian seas. The overrunning of the local southwest winds by the oceanic winds or the encounter of the northwest land winds with the oceanic winds result in the formation of cyclones."

Andamans not only experience the tropical cyclones during the transition period but also a number of typhoons, which originate in the China seas; their remnants, after travelling across south China and Burma or across Indo-China and Siam, intensify again into storms in the Bay of Bengal. Hence the full force of these storms are experienced in the islands.

TABLE I

Frequency of Cyclones

	J	F	M	A	M	J	J	A	S	O	N	D
Bay of Bengal	2	0	1	8	18	9	3	3	5	27	16	8

TABLE II

Percentage frequency of severe cyclones

	J	F	M	A	M	J	J	A	S	O	N	D
Bay of Bengal	0	0	2	8	18	5	3	2	8	22	24	8

GENERAL CLIMATIC CONDITIONS

The islands have very little annual variation, being 3° to 5°F for mean temperature and 4° to 7°F for mean maximum temperature. The annual mean maximum temperature varies from 85° to 87°F, and mean minimum from 75° to 77°F and mean temperature from 79° to 82°F. The relative humidity is also very high and the average is 80%.

1 Roy, S. C. & Roy, A. K. Structure and Movement of Cyclones in the Indian seas.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

The high temperature coupled with the high relative humidity gives rise to a high sensible temperature. The weather is always warm and very sultry but is tempered to some extent by the pleasant sea breezes.

There is no rainless month in the South Andaman and the rain is received both from the southwest and northeast monsoons. As one goes towards the north of the islands the amount of rainfall decreases. During the southwest monsoon rain continues for days together.

During the transition period there are frequent cyclonic disturbances in the islands and some of them are so violent that they create havoc to navigation as well as settlement.

The diurnal variation in temperature is not at all great and the sky is at any moment overcast with clouds which may cause rainfall from a few minutes to a few hours.

TABLE III

Temperature conditions in (°F)

	J	F	M	A	M	J	J	A	S	O	N	D
Port Blair (11° 40' N & 92° 43' E)												
Mean Maximum	84·2	85·5	87·5	89·1	86·7	84·3	83·8	83·4	83·1	83·9	83·9	83·6
Mean Minimum	71·6	70·5	71·5	74·7	75·6	75·0	75 1	74·7	73·8	73·8	73·5	72·9
Long Island												
Mean Maximum	85·7	79·2	83·3	84·8	84·2	82·8	81·4	81·0	80·1	83·0	82·2	81·8
Mean Minimum	72·7	74·6	77·1	78·1	79·8	79·8	78·6	78·6	78·0	78·8	76·9	76·9
Mayabunder												
Mean Maximum	83·6	79·5	83·1	85·1	83·9	82·5	81·4	80·7	80·1	82·1	82·4	80·9
Mean Maximum	71·6	74·9	77·6	79·2	79·5	79·4	77·9	77·9	77·18	75·9	7·5	75·5

April is the warmest month of the year. The lowest mean temperature, however, does not occur in a particular month in all the parts. There is a tendency for this to take place in February in the northern half of the islands and during October and November in the southern half. The highest and lowest temperature ever recorded in the islands are 97°F and 62°F respectively. Even though the islands have a latitudinal extension of 3°, the change of temperature from north to south is not marked. Due to the heavy clouds over Port Blair, temperature is appreciably reduced.

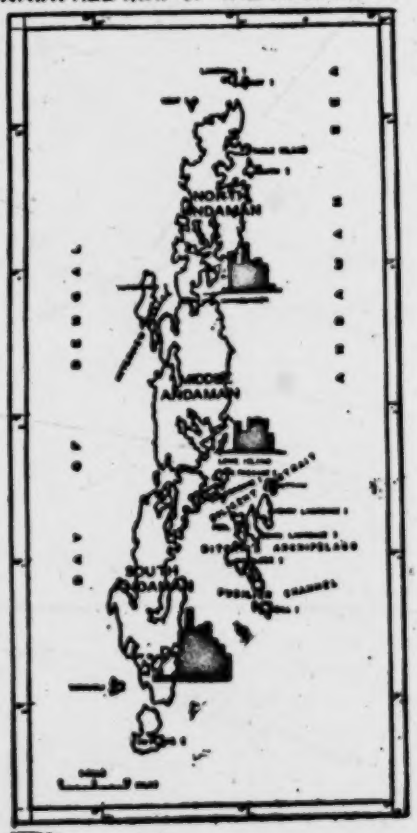
10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

Rainfall Conditions

132 The islands experience fairly good rainfall, as already said, from both the southwest and northeast monsoons. The southwest monsoon brings the maximum amount of rainfall. The regional distribution of the rainfall is very uneven. The Table Island situated in the northeast part of the islands has an annual average of 76". Long Island off the east coast of the Middle Andaman 55.95", Mayabunder 69.12" and Port Blair in the South Andaman 123". Broadly speaking, the amount of rainfall decreases as one goes towards the north as well as to the northeast. The southwest region experiences the maximum amount

[102]

RAINFALL MAP OF THE ANDAMANS



10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

of rainfall because it comes first under the impact of the southwest monsoon. As the old observatories at Port Blair and Nancowrie are located on the leeward side it is probable that at stations on the windward side in these areas the rainfall is heavier (probably more than 140"). This greater amount of rainfall helps the development of a denser tropical vegetation in the western coast.

The southwest monsoon burst over the South Andaman by about 20th May (15th June at Calcutta) accompanied by thunder and rain. In May the number of rainy days is 16, in June 21, in July 26 and in August almost on all days. But the amount of rainfall is not maximum in August (16.29") which is so in the month of June.

The two periods of maximum precipitation are

(a) May and June, and

(b) September and October.

which correspond to the beginning and the end of the southwest monsoon.

The rainfall of the northeast monsoon begins from the month of October.

January and February are almost rainless months in the northern stations. Port Blair experiences rainfall almost throughout the whole year but the fluctuations of seasonal rainfall are quite large (1.11" in February and 21.75" in June). The highest annual rainfall recorded during the last 60 years is 150" and the lowest is 84".

TABLE IV

Rainfall in inches

	J	F	M	A	M	J	J	A	S	O	N	D
Port Blair	1·79	1·11	1·12	2·36	15·13	21·75	15·43	16·29	17·40	12·51	10·52	7·92
Long Island	0	0	0·11	0·48	9·65	6·62	10·62	10·68	10·30	6·00	0·87	0·62
Maya-bunder	0	0	0·19	1·20	12·10	8·38	15·43	9·94	10·00	8·81	2·03	0·92

Table Island—Data not available.

Humidity

It is high throughout the year being highest during the southwest monsoon when the average is as much as 90% and on individual days the atmosphere may be saturated. The lowest humidity occurs during December to February when it varies from 72 to 75%. The annual variation is about 15%. The humidity in the south is more than in the north.

10:Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

132 Clouding in all the months is more than 13th of the sky and is maximum in the monsoon months being about 8 to 9/10ths. On 2 out of 3 days, sky is overcast in these months.

Wind

The islands are generally windy, particularly Table Island and Port Blair where in July the average wind speed is 15 m.p.h.

TABLE V

Mean daily wind speed in m.p.h.

	J	F	M	A	M	J	J	A	S	O	N	D
Port Blair	8·8	7·1	5·9	8·6	13·7	15·9	13·4	10·4	7·6	8·4	9·1	9·5
Table Island	6·9	6·1	5·7	6·0	10·4	15·0	16·2	12·2	7·6	7·1	8·0	9·0

During November to February, winds are mainly from the north and east and during southwest monsoon months from west and southwest. The months of March and April are transition months.

Thunder

The islands experience thunders in about 45 days out of a year. From March to October, each month experiences more than 3 thunders. The most thundery months are April, May and June with not less than 8 thunders a day.

THE CLIMATIC SEASONS

As already said, the temperature of the Andamans is more or less uniform throughout the year but the rainfall fluctuates with the change of season. In spite of the equable nature of the climate, a few climatic seasons are experienced in the islands because of the mechanism of the two monsoons in two specific periods, passage of cyclone during the transition time etc.

(1) Cool season — From December to February
(2) Hot season — From March to Mid-May
(3) Southwest monsoon season — From Mid. May to Mid. October.
(4) Post southwest monsoon season — From Mid. October to November.

Cool Season

This season has a mean maximum temperature of about 83° to 87°F and a mean minimum temperature of 71° to 78°F. The temperature is not at all low as compared to the maximum one. A temperature below 60°F has never been recorded in Port Blair.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

Port Blair records 8" rainfall in December. 1" to 2" in January and February. In the stations of the north these months are almost rainless. However some very heavy falls, 11.6" in a day in December, 8.2" in January and 5.2" in February have been recorded. Some severe storms are experienced in this season which are formed in the neighbourhood of the Nicobars, usually to the northwest. Occasionally some storms formed in the southwest part of the Bay proceed northwest and north and finally recurve into the northeast and affect the Andamans. More than 70% of the winds in this season blow from the north, northeast and east. As one goes towards the south pressure decreases but the pressure gradient is low.

Hot Season.

April is the hottest month with a mean maximum temperature of 89° to 90°F and a mean minimum temperature of 75° to 80°F. Even during the hottest spells the temperature does not exceed 97°F. Generally little amount of rain occurs in March and it increases in April and very much in May. Rainfall in April and May are of thundery type usually occuring in the afternoon and the evening. On an average 8 thunderstorms are experienced during April and May. The number of tropical storms also increases from March to May. Many of the storms in April and in the later part of the month originate in the neighbourhood of the Andamans, usually to the southwest of them. The storms generally move towards the north and the northwest and recurve later. Some storms which from during the first fortnight of May originate in the Andaman Sea and move either northwest or northeast causing heavy rainfall.

The winds, in the month of March, generally blow from the northeast, northwest and east directions and there are considerable number of calm days (wind speed 5.9 m.p.h.). In April the wind directions are more or less the same but with the gradual change of the pressure system more wind is found to move from the southwest and west and in May the predominant winds are from the west and southwest. The wind speed is high (8.6 m.p.h.) These features indicate the beginning of the southwest monsoon.

The Southwest Monsoon Season.

The monsoon breaks out over the islands by about the 20th May accompanied by thunder and rain. The rainfall gradually increases and reaches its peak in June at Port Blair, in August in Long Island and Mayabunder. Towards the end of the September, remnants of typhoons

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

of the China sea move across lower Burma and affect the North Andaman sea. The influence of these typhoons are particularly felt in the North Andaman.

In July, heavy falls of 15.85" have been recorded in 24 hours at Port Blair. The sky is overcast with clouds for days together. This appreciably reduces the temperature. The mean maximum temperature is 84.3°F and mean minimum temperature 75.0°F in July, the characteristic month of this season.

Post Southwest Monsoon Season.

This is the period of cyclonic disturbances. These cyclones of dangerous severity commence as feeble circulations and they have a progressive movement, with the stormfield advancing on a curved or sometimes a straight tract. The average velocity is about 200 to 300 miles per day. A general picture of the tropical cyclone is given below.

In front of a tropical cyclone the sky is covered with hight clouds in which halos sometimes appear. The air becomes sultry and oppressive; the wind falls almost to a calm and on the oceans a heavy swell rolls up. In the next stage, a breeze springs up, the clouds become lower and heavier and pressure begins to fall. Afterwards heavy rainclouds appear, first on the horizon and then advance across the sky; as the rain clouds pass overhead, the rain falls in torrents. The wind becomes fierce while barometer falls rapidly. High or tremendous seas are superimposed on the heavy swell. The sea sprays and rains destroy all visibility. When the wind has reached its greatest violence, suddenly the centre of the storm arrives. Here the wind suddenly drops from hurricane force to a light unsteady breeze, or sometimes to a complete calm. At the calm centre the lowest pressure is recorded and often there is a complete absence of low cloud and rains; the sun, moon and stars may be visible according to the time of day when the calm centre is traversed. Following the passage of the centre, the wind suddenly increases to hurricane force again but from the opposite direction; the torrential rain is renewed and barometer rises as quickly as it fell. As the end of the storm approaches, the wind falls and the rain clouds break and disappear leaving only the high clouds. Finally the wind drops, the sky clears and the pressure becomes normal. The average number of storms is about one per year. In November, the frequency of the storms that affect the area is about the same as in October and more than one in every two is likely to be severe.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

CLIMATIC REGIONS

It is difficult to divide the islands into climatic regions. The islands having only a length of 192 miles and a width of 32 miles, when maximum, may bring out some changes in the climatic elements from north to south but little change from east to west. Whatever variation is found from east to west, is due to the presence of the north to south running hill systems. 132

If we consider the rainfall of the islands, it decreases as one goes towards the north and the east. The primary reason is the fact that the southwest monsoon causes heavy rainfall in the south and as it moves towards the north its rain bearing capacity decreases and ultimately causes less rainfall. Besides this the micro-climatic factors have important roles. The north-south system of hills evidently results in a greater rainfall in the west and more correctly on the windward side and an appreciable decrease in the leeward side. The northwestern monsoon as well, causes some rainfall in the northern and the eastern section of the islands. As such an increase in annual rainfall amount is experienced in the Table Island, situated in the northeast extremity of the North Andaman.

The temperature, as discussed previously, is almost the same in all the stations during the whole of the year.

Hence if any attempt is made for a division of the islands into climatic regions, the rainfall stands as the most important factor. As the islands have got only 4 stations, all of them having insufficient data[1] except Port Blair, which are all situated in the east coast of the Andamans, the successful division of the islands into climatic regions becomes impossible.

1. All the 3 stations except Port Blair.

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

sea itself, but to the rising and falling of the land with the recurring movements. Even between 1951 and 1952 there was a noticeable alteration in the level of the north-east coast of Little Andaman, following an earthquake in July 1951; the Onges had to move the communal hut at Tambe-e-buiè further inland, because the sea, previously twenty metres away, had begun to come right up to the hut. In several places giant trees centuries old crashed to the ground, their roots left without any foothold as the level of the land fell suddenly all along the coast. If this can happen in one year, it is hardly surprising that what now appears as an archipelago is in reality a continuous mountain chain, its levels broken and rebroken over thousands of years till the islands became separated by the sea for good, their coasts so eroded that subsequent quakes have failed to reunite them.

It is highly unwise even to attempt a landing on Little Andaman during the monsoons. Both the north-east monsoon in June and August and the south-west in November and January whip the seas up into a frenzy, but in late April and again in late September the sea is quite calm. Since both monsoons pass over vast tracts of sea, they become saturated with water vapour and bring torrential rains, not infrequently accompanied by hurricanes violent enough to strip all the leaves off the trees. After these storms the jungle, normally almost impenetrable, is made even more so by the tangle of fallen branches and the trunks of old trees torn up by the wind or the lightning. The lightning strikes the tallest trees, which may smoulder for days on end without setting fire to the sodden forest, so great is the humidity. I have often seen one of these flaming torches; the Onges, ignorant as they are of the art of making fire, take advantage of the phenomenon, as a continuous supply of burning wood is a necessity in a climate which is so damp and humid all the year round that matches become useless after twenty-four hours unless suitable precautions are taken.

Once on the island, virgin forest stretches endlessly before one in undulating waves of treetops, black and terrifying. From the tops of the trees thousands of lianas hang everywhere, winding like snakes from trunk to trunk, forming an inextricable tangle, yet somehow always elegant, binding the entire forest into one dense mass. Many of the tree-trunks reach diameters unheard of in temperate climates. Some of them have hollow cavities, treasured by the Onges as hiding-places or temporary shelters.

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

It is impossible to imagine a more varied or richer sight than the Andamanese forests at any time of year. The colours, and the light effects, particularly at dawn and at sunset, the myriads of flowers of every hue and scent, every shape and size, the strange noises, all combine to produce an effect which stuns the outsider. The spectacle reaches its climax at night when the moon is full; the tops of the trees are bathed in a silver light and the great lianas seem to writhe like serpents. As though inspired by the light, the nocturnal animals stage a kind of pageant for the occasion and their cries are even more frequent and more rhythmic than usual. The Andamanese themselves seem bewitched without realizing it, spellbound by the weird atmosphere.

To anyone unfamiliar with the tropics, the swift change from darkness to light and back again comes as a surprise. Night in the tropics is never silent – the eerie voices and calls, often with a strange pitch, seem to cease for a brief moment just before the sudden onset of darkness and again just before the return of the light. As night falls the fascination of the jungle grows. Even the natives feel some urge to keep their voices down, as if out of respect for some natural solemnity. (This, however, is not exclusive to the Andamanese, and it has a perfectly rational explanation. In tropical forests, and in the deserts, men speak softly so as to catch every slightest sound, a passing animal perhaps.) At dawn the birds start up as though they were tired of silence. There is no great variety of calls; most are very piercing, although still pleasing, and in the crescendo of sound which follows the dusk and dawn silences, the forest is transformed.

One thing that has helped the Onges to survive so long despite the inevitability of their decline is the climate of the islands, which is usually very pleasant and so less liable to exacerbate biological weaknesses.

Normally, the Andamans have four months of very good weather from December to March, which may extend by a few days into November and April. February is nearly always the driest month and the calmest, although there are exceptions, as I know from my own experiences when trying to land on the island. In the remaining months there is frequent rain, sometimes torrential, with raging seas, but relieved by periods of clear sky.

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

132 In the absence of rain the air is clear with few extremes of temperature, and mean temperatures are fairly constant throughout the year. Towards the end of March and throughout April, the thermometer rarely rises above twenty-five degrees centigrade in the shade, although it can rise above thirty-five degrees centigrade in the middle of the day. Heavy rains, which reduce the temperature noticeably, begin in mid-April; but a period of relatively dry, almost cold weather may occur at the beginning of May. The south-west monsoon reaches its peak in the middle of May, and continues to the end of November. During this period the temperature is never high, but the rains are frequently torrential; storms and terrific gales follow one after another and in some years the monsoons are so violent that the trees are completely stripped of their leaves in a matter of hours. Even so, there are sudden calms and in August there may be some very fine days, among the best of the year when they occur.

132 131 This climate, with its very minor variations in temperature, is explained by the geographical position of the islands. The two main islands of the archipelago run north–south, between 10° 30′ and 13° 30′ North and 90° and 92° 33′ East, rarely over forty kilometres wide. Great Andaman alone is three hundred and twenty kilometres long and Little Andaman is fifty kilometres. With the south-west monsoon the west coast faces the brunt of the storms, while the north-east monsoon hits the eastern coastline. Both hit the islands after crossing vast expanses of the Indian Ocean, but the south-west monsoon is the wetter; together they refresh the highly fertile earth.

Little Andaman forms about a sixth of this area. Its southernmost point touches 10° 30′ North and the northern tip is 10° 56′ North. On the west coast the monsoon winds are so strong and go on for so long that they have affected the growth of vegetation, beating the tops of the trees down towards the north-east, while both monsoons carry the sea spray right across the island.

132 137 With the continual dampness and relatively even temperature the forests rise before one as the coastline approaches, black, savagely beautiful, unconquered and unconquerable. Like all the rain forests of the tropics they are always a lush green, except where the monsoon has stripped the trees of their leaves. Normally the trees do not lose their leaves in the winter; each species has its

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

own growth period, but there are so many of them that there are green leaves, and trees and plants in flower or fruit, all the year round.

There are, of course, more trees and shrubs without leaves when the heat and the dry season are at their peak, during our winter. None lose their leaves all at once, however, and in most cases they fall gradually throughout the year, accompanied by the continuous appearance of new growth. In the absence of any definite seasonal cycles, the trees grow almost continuously, so that they have no marked growth rings corresponding to the various seasons. Nor is there any sudden colouring of the leaves *en masse* with the onset of autumn; instead a permanent range of colours makes the forest incredibly beautiful at any time of the year.

Sometimes in the dry season one sees the tree known as the Flame of the Forest, one of the Leguminosae, standing out against all the others with its vermilion-red flowers, visible for considerable distances on the slopes of the hills. Rather larger than our acacia, it loses all its leaves at the beginning of January, to become covered with a mass of large flowers. I have seen similar trees in South Africa; covered with a profusion of brilliant flowers they are a wonderful sight, standing out like a sheet of flame against the sombre background of the forest round them. Even the lianas seem to respect them and leave them alone, as though fearing the slenderness of the branches, so that the trees rise like prisoners escaped by chance from the suffocating blanket of climbers all round them.

The strangling *Ficus* seems to escape them too, although lianas rage everywhere in the Andamans, their path strewn with victims. One seed of these voracious plants, left with a bird's droppings, can mean the death of a giant tree. If it lodges on a branch, or in a fork where there is a little moss or earth, it will grow and send its ropes of aerial roots down to find the earth. As soon as they touch the earth they root tenaciously, sending back energy for further growth. In a few years the ropes begin to enfold the tree, clinging to it and fusing together, till in the end there is nothing but an insidious, clinging network right round the trunk which first gave it shelter.

Every stage of this process is to be seen in the forest, from the initial unseen assault by the tiny aerial roots to the complete enveloping of the victim. Right from the first there is no escape; the

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Andamans AZ2

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the river and indeed so practically contiguous that the towns are virtually one.

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The real interest of the Tamprabarni, its irrigation apart, lies in the future. The Tamprabarni is probably unique among Indian rivers in that it was harnessed to provide direct hydraulic power for cotton spinning: the first of two turbine-driven mills was set up in 1885. At Papanasam there is a 300-ft fall which is being developed to produce 21,000 kW (ultimate capacity 28,000). The actual engineering work is completed, and full development is limited only by doubts as to the need of conserving water for irrigation; but the possibilities of cheap electricity in this area are manifold: foremost perhaps an increase of well-irrigation in the half-dead edaphically arid tracts, and industrially the revivification of the palmyra sugar industry, the extension of cotton in all its branches. Oilseeds could certainly be more widely cultivated in the red soil area, possibly leading to soap and allied industries, and the hills contain vast reserves of bamboo for paper-making.

The Andaman and Nicobar Islands

A 133

These two groups, directly under Delhi, continue the trend of the Arakan Yomas, linking them to the Sumatran ranges. They differ between themselves to a marked extent; both physically and culturally.

1. *The Andamans*

These number over 200, extending NNE/SSW for some 220 miles between 10° and 14° N; the total area is 2500 sq mls, of which the great bulk is in the three major islands of North, Middle, and South Andaman. These three, indeed, are separated only by narrow mangrove-fringed inlets, so that they are often referred to as virtually one island, Great Andaman. The islands are formed of sandstones, limestones, clays, and some serpentines, probably mainly Tertiary, and are highly dissected, rising to 2400 ft. With a temperature never far from 85° F, rainfall over 100 ins., and a monsoonal distribution with no really rainless season, they are naturally jungle-covered: mangrove along coasts and inlets, tropical evergreen along valleys and on steeper wetter slopes, elsewhere moist deciduous. Forestry is perhaps the most important economic activity and is fairly well organised; a match factory was set up about 1930.

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The total population in 1941 was 21,316, but this included a strange medley: aboriginals, convicts and ex-convicts with their 'local-born' children, officials. A century ago the aboriginals probably numbered about 5000; in 1931 they were estimated at about 460, in 1941 at 62; many tribes have died right out. At once shy and savage, they had a reputation for ferocity, and early settlement was avowedly to protect shipwrecked